

AVRA VALLEY LAND USE STUDY
for CITY OF TUCSON PROPERTY HOLDINGS
March 1996



Prepared by the City of Tucson Planning Department
in cooperation with

Tucson Water
City of Tucson Real Estate Division
City of Tucson Parks and Recreation Department
City Attorney's Office

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Mayor and Council approved the *Avra Valley Land Use Study for City of Tucson Property Holdings* on March 4, 1996

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**EXECUTIVE SUMMARY
March 1996**

Background

The City of Tucson owns almost 23,000 acres of land (approximately 36 square miles) in the Avra Valley. This land was purchased and retired from agricultural use to secure the water rights associated with the lands and preserve the groundwater for urban use. Ownership of the water rights allows Tucson Water to pump groundwater in the Avra Valley, particularly during peak demand periods, to service their customers.

This study is an update to the 1984 *Avra Valley Land Use Study - Update Report*. The 1984 study found that intensive land use activities were generally inappropriate in the Avra Valley. Over the years, Tucson Water has received a minimal number of requests to use or lease portions of City-owned parcels for various uses and has approved two leases. Recently, the number of requests has risen.

In December 1994, the Mayor and Council recognized the need for a new evaluation of potential land use activities and directed the Planning Department “to develop a master plan for restoration and management of the City’s land in the Avra Valley.” Planning staff prepared draft reports and maps which were reviewed by the Water Department, Parks and Recreation, Real Estate, Environmental Management, and the Attorney’s Office. The report was also reviewed by many public and private entities, including the Arizona Department of Game & Fish, the Natural Resource Conservation Service (formerly the Soil Conservation Service), the Arizona Department of Water Resources, Tucson Mountain Park, and the Arizona-Sonora Desert Museum.

The Avra Valley study area consists of 430 square miles of land generally bounded by the Pima/Pinal County line to the north; San Xavier District to the south; the Saguaro National Monument to the east; and the alignment of Pump Station Road to the west. The study area is located about 25 miles from downtown Tucson, and City-owned parcels are scattered over a north-south distance of 25 miles. The City’s management emphasis to date has been primarily directed toward maintenance, particularly weed control. Weed control and revegetation is necessary due to the disturbed nature of retired farmland.

Goals of the Study

After discussion with City staff, in particular Tucson Water staff, the following goals were generated for the study:

1. To encourage appropriate land uses for the City-owned property in Avra Valley that preserve the water quality and quantity of the underground aquifer and preserve the water rights associated with the acquisition.

2. To encourage land uses and associated management practices which are beneficial to the interests of Tucson Water customers and are cost effective.
3. To assure that the City of Tucson continues to be a good neighbor by considering the compatibility of potential land uses on City land with existing and future land uses under other ownership.

Inventory and Analysis

Staff conducted an extensive inventory and prepared a series of maps delineating existing conditions of the study area. Generally, the City's property holdings are in good condition. Approximately fifty percent of the properties have a consistent vegetative cover with minimal weeds. General clean-up of farm structures and machinery has improved the condition and safety of the properties. By retiring the Avra properties from farming, the City of Tucson has also diminished the potential for nitrate pollution from agricultural fertilizers. Facts and issues pertinent to leasing the properties were identified, including the following:

- Approximately two-thirds of the City property is in the 100-year floodplain.
- Many land use options present a potential threat to the groundwater resource.
- Most of the Avra Valley lacks urban infrastructure such as paved roads and utilities.
- Pima County Zoning and the Comprehensive Plan support only low intensity uses.
- Revegetation that has occurred over 10-15 years could be damaged or destroyed.
- Leasing the properties may incur more costs than benefits for the City.

Opportunities and constraints to uses of City land were analyzed, and location maps for three land use intensity types were generated. These maps designate general locations for potential activities, should the Mayor and Council determine that leasing the land is appropriate. The land use and management recommendations are consistent with the goals of the study and the findings of the analysis.

The study also considered management and restoration issues regarding the Avra Valley properties. These issues include:

- Property management procedures and responsibilities should be more clearly defined for the City departments involved.
- Approximately half of the property needs revegetation, and/or control of weeds, dust, and erosion.
- Typical for rural, sparsely populated areas, trespassing, vandalism, and dumping are continuing problems.
- Property boundary surveys, fencing, and signage are needed.
- Remaining farm structures and equipment require clean-up and/or removal.

Summary of Land Use Recommendations

The Avra Valley Land Use Study supports the conservation and on-going rehabilitation of the City-owned Avra Valley property. Preservation of the quality and quantity of the water resource associated with the lands is of primary importance. The Avra Valley watershed provides the City of Tucson with high-quality drinking water, and the large areas of undeveloped property offer future opportunities for recharge and other water-related projects.

A cost-benefit analysis should be conducted before leasing Avra Valley property. Many requested leases would result in minimal monetary remuneration and may not cover the City's costs associated with lease submittal and evaluation procedures, management, monitoring and enforcement procedures, particularly when problems occur.

The study supports the use of City-owned property for low intensity activities such as open space for wildlife habitat, and passive recreational uses. Public agencies are willing to work with the City to restore vegetation and enhance habitat, creating an opportunity for the City to demonstrate environmental leadership. Leases for activities such as grazing and active recreation are generally not recommended, with some potential exceptions under strict lease conditions.

The Study does not recommend leasing City-owned land for urban development, such as residential, commercial, or industrial uses, or for high-intensity recreation, public entertainment, or events. The lack of appropriate infrastructure and the potential threat to the water resource are major constraints to these activities. Another consideration is the potential impact from the development and operation of such activities on nearby tourist attractions, including Saguaro National Park, Tucson Mountain Parks, and the Arizona-Sonora Desert Museum.

Summary of Management and Restoration Recommendations

The study recommends active management of the properties by one department - Tucson Water - with assistance as needed from Real Estate and other City departments. A comprehensive management program and property inventory are needed, with a data base that includes a legal description of each farm, boundary survey, historical information, condition of the land cover, and the location and condition of all structures. Environmental concerns, such as potential soil contamination from previous agricultural uses, should be assessed, followed by an active clean-up program if necessary. Leasing procedures need to be standardized, and only short-term leases should be considered.

Current management expenditures are a relatively minor cost compared to the asset value of the property at \$25,000,000 and the value of the water resource. Tucson Water has accomplished a great deal in restoring and managing the Avra Valley properties with minimal staff and funding. However, it is recommended that the City continue to address property restoration needs and upgrade management procedures.

**AVRA VALLEY LAND USE STUDY
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I. INTRODUCTION

A. OVERVIEW

The City of Tucson owns almost 23,000 acres of land (approximately 36 square miles) in the Avra Valley. This land was purchased from the 1970s to the mid-1980s with Water Bond Funds, for prices ranging from \$500 per acre to \$2,300 per acre. The total purchase price of the properties was approximately \$25,000,000 and present property values have changed little from the original acquisition costs.

The land was retired from agricultural use to secure the water rights associated with these lands and to preserve the remaining groundwater for urban use. The water rights have allowed Tucson Water to pump groundwater, particularly during peak demand periods, to service their customers.

In 1984, the *Avra Valley Land Use Study - Update Report* was completed. This study was developed by members of the City's Planning Department, Tucson Water, the Real Estate Division, and the Attorney's Office. The study discussed management problems and other issues such as legal considerations that affect the feasibility of various land uses. A "laundry list" of potential activities and a general ranking of their viability was included in the study; generally, the study did not find intensive land use activities appropriate in the Avra Valley.

Over the past years, a minimal number of requests to lease City-owned property have been submitted and two leases have been approved. Recently, requests to lease portions of City-owned parcels for various activities have increased. The requests and proposals range from wildlife habitat to drag strips for race cars.

As a result of these requests, the Mayor and Council directed the Planning Department "to develop a master plan for restoration and management of the City's Avra Valley land." In response to Mayor and Council direction, the Planning Department, in cooperation with Tucson Water, the Real Estate Division, the Parks and Recreation Department, and the Attorney's Office, prepared the *1996 Avra Valley Land Use Study for City of Tucson Property Holdings*.

B. STUDY AREA

The Avra Valley study area consists of approximately 430 square miles of land bounded by the Pinal/Pima County line to the north; the Diamond Bell Ranch and San Xavier District to the south; the Saguaro National Park and Tucson Mountain Park to the east; and the alignment of Pump Station Road to the west (see Avra Valley Location map, Figure 1). The study area spans a north-south distance of 25 miles, and is located about 25 miles from downtown Tucson. As a comparison, the land within Tucson City limits is currently 180 square miles or about one-third of the size of the study area (see the Avra Valley and City of Tucson Area Comparison map, Figure 2).

The existing character of the Avra Valley is rural, with active farms interspersed with large parcels of undeveloped property. The undeveloped parcels are primarily owned by various State and Federal agencies, most notably the State Land Department, and are leased for grazing. The City of Tucson Water Department is also a large landowner of undeveloped retired agricultural land in the area. The City's properties are scattered throughout this 430 square mile study area.

C. PURPOSE AND GOALS

The purpose of this study is to update the *1984 Avra Valley Land Use Study - Update Report* and provide direction for land use and management of City-owned property. The *1996 Avra Valley Land Use Study for City of Tucson Property Holdings* builds upon the 1984 study. Not only are current issues and problems examined but more site-specific information has been inventoried and analyzed, such as location of infrastructure, current natural conditions of the land, ownership patterns, legal issues, and water resource and quality issues. The 1996 study recommends potential land uses for City-owned property and discusses management and restoration issues. The goals of the study are:

1. To encourage appropriate land uses for the City-owned property in Avra Valley that preserve the water quality and quantity of the underground aquifer and preserve the water rights associated with the acquisition.
2. To encourage land uses and associated management practices which are beneficial to the interests of Tucson Water customers and are cost effective.
3. To assure that the City of Tucson continues to be a good neighbor by considering the compatibility of potential land uses on City land with existing and future land uses under other ownership.

LOCATION MAP LINK

AVRA VALLEY AND CITY OF TUCSON AREA COMPARISON MA P- FIGURE 2 LINK

D. BACKGROUND AND HISTORY

According to some historians, “Avra Valley” is derived from a Tohono O’odham word meaning “Big Plain.” Families that helped settle the Avra Valley include the Aguirre, the Wong, the Kai, and the Robles according to *Echoes of The Conquistadores*, written by Yjinio F. Aguirre. The book offers a picture of early life in the Avra Valley area through the history of the Aguirre family. The family moved from Chihuahua, Mexico to New Mexico and finally settled in Avra Valley in the 1800s. By 1868, the Aguirre family had established a stage route from Tucson to Altar and other towns. The Buenos Ayres Ranch near Sasabe, now the Buenos Aires National Wildlife Refuge, was established by the Aguirre family.

In 1892, a family member settled in an area known as Red Rock, north of what is today known as Marana. The Red Rock area had an abundance of feed on the land (it was noted that on some occasions, the grass would reach the stirrups of a saddled horse) but no permanent water. A well was dug six miles southwest of Red Rock and another ranch, El Cerro Prieto, was built. Both ranching and dryland farming (during the rainy season) were in operation. The rich river-bottom soil was said to produce wheat, barley, corn, squash, watermelon, lentils, and beans.

By 1936, many of the cattle ranges in the southern part of the state had deteriorated, and wildlife had diminished. Early settlers remember herds of deer, coyote, bobcat, javelina, fox, badgers, raccoon, and mountain lion, as well as several species of birds. According to the book, the poor condition of the range was attributed to years of drought.

In about 1940, sections of the Rancho Cerro Prieto were sold to the Kai and Wong families for cotton farming. The Wongs remember living in a tent in the cotton field until 1947. By the 1950s, the Wongs had purchased thousands of acres in the Avra Valley that were irrigated with a system of wells. These and other private wells in the area withdrew large quantities of groundwater, with a subsequent lowering of the water table.

E. LAND OWNERSHIP PATTERNS

Most of the lands in the Avra Valley are in public ownership. The table below shows the acreage held by each of the seven classifications of landowners. The lands owned by the City are scattered throughout the valley, the result of the City’s policy to purchase farms only from willing sellers. The last farm purchase was in 1986, bringing the total to 22,868 acres of City-owned land in the Avra Valley.

Land Ownership in the Avra Valley Study Area

OWNER	ACRES	% OF TOTAL
BLM	18,675	6.4
State of Arizona	76,249	26.1
Tohono O'odham Nation	37,496	12.8
Tucson Mountain Park	7,679	2.6
Saguaro National Park	20,048	6.9
City of Tucson	22,868	7.9
Private	109,489	37.3
TOTAL	292,504	100.0

F. MANAGEMENT AND RESTORATION OF CITY LAND

When the initial land purchases were made in 1971, the City generally ignored the need for maintenance of the retired farms. This policy led to problems such as uncontrolled weed growth, dust, erosion, vandalism, and trespassing. Because of those problems, some of the remaining farmers filed lawsuits against the City and were generally successful in their claims. As the expense of paying claims and other associated costs mounted, the Manager's Office determined that a systematic land maintenance program was necessary. In 1979, the Real Estate Division was created and maintenance of the Avra Valley properties was established as one of its tasks.

Management by the Real Estate Division

From 1979 to 1992, the management of the City-owned lands in Avra Valley was performed by the City's Real Estate Division. The *1984 Avra Valley Study* stated that the City spent over \$100,000 a year on the management of approximately 18,000 acres of City-owned land, about \$5.56 per acre. This included the salaries of two full-time resident caretakers, the costs of revegetation efforts, and the costs of equipment maintenance.

As the land management program was implemented, the City addressed the important problems associated with the transition from plowed and irrigated fields to a stable vegetated state that required little or no irrigation. A program was initiated to grow cereal grains instead of cotton as the last irrigated crop. Cotton, as the last irrigated crop, leaves fields barren due to growing practices. Such fields are immediately subject to erosion and establishment of tumbleweed infestation. Fields with grain as the last crop reduce erosion problems and support the re-establishment of native plant and animal species. The farms subject to this grain planting program are, in most cases, in much better condition than those that were not.

Russian thistle (often called “tumbleweed”) tends to be the first plant species to establish itself after land is disturbed from its natural state. Russian thistle is designated by the State of Arizona Department of Agriculture as a noxious weed that requires control. In addition, protection of the adjacent active farms and grazing in the area necessitated active thistle control as a good-neighbor policy. Thistle grows quickly, can ruin existing crops, and creates extreme fire hazard.

In order to manage weeds, dust, and erosion the maintenance crew began a program of weed control through selective burning and reseeding the area with native vegetation. Imprinting the soil was tested to retain rain water where seeds were planted. Other management procedures included the installation of fences and signage in some locations to deter trespassing, theft, vandalism, and wildcat dumping.

Current Management Practices

In 1992, the day-to-day maintenance of the City-owned property in Avra Valley was transferred to the Water Resources Division, Water Plant Maintenance Section of Tucson Water. The Real Estate Division of the Transportation Department continues to provide assistance in the areas of administration for leases and insurance.

In the Fall of 1994, a study was done by the City’s Budget and Research Department to estimate the cost to Tucson Water for the management and maintenance of the nearly 23,000 acres of Avra Valley properties. The cost for the 1994-1995 fiscal year was estimated at \$105,230, or approximately \$4.60 an acre, a decrease per acre from the 1984 cost reflecting higher start-up costs to address larger problems at the beginning of City ownership of the parcels. The Budget Department noted the maintenance costs vary from year to year depending on such things as equipment failure and the amount of wildcat dumping necessitating clean-up on the properties.

The problems associated with managing the City-owned properties in the Avra Valley today are somewhat different from when the properties were first purchased. The major concern for the first decades of ownership was the establishment of fencing and a vegetative cover to reduce dust, erosion, and weeds. Today, vegetation has been established on many parcels, in some cases very successfully.

Current management issues pertain to trespassing, vandalism, wildcat dumping, unauthorized grazing of cattle, and the inherent clean-up problems associated with the remaining vacant farm structures and nonoperational, retired agricultural wells. An informal survey of the properties by Tucson Water indicates over 15 houses or buildings that need to be demolished and cleared away. Three of these buildings have been identified as potential hazards by the City’s insurance inspector. The vacant structures have been decaying over time with vandalism contributing to the process.

Some trespassing, such as use of City-owned land for bee hives, has been overlooked in the past due to the beneficial nature of bees. However, the hives become a problem in the area when the owners do not provide water for their bees and the bees become aggressive in their search for water on neighboring properties. In addition, the potential exists for African bee infiltration.

The cutting of weeds is required on several parcels to eliminate fire hazard and minimize problems with “noxious weeds.” A revegetation program is still needed for a few parcels. Several parcels require floodcontrol and/or grading in order to make the cutting of weeds and revegetation feasible.

Current Maintenance Schedule

The current maintenance of the Avra Valley properties is performed on an as-needed basis by the full-time equivalent of one and three-quarters employees. One full-time caretaker, a City of Tucson employee, lives on the City-owned land in Avra Valley known as the Reeves Farm. The caretaker is responsible for the majority of the assessment and execution of needed maintenance.

The caretaker’s weekly maintenance program typically includes one day of property inspection, three days cutting weeds, and one day either installing or repairing fences. The caretaker also assists in property clean-up and repair of the maintenance vehicles. An additional three-quarter-time caretaker/equipment operator assists in the maintenance and repair of fencing and signage, the cutting of weeds, repair of access roads, maintenance of the operational production wells, and clean-up of debris left at wildcat dump sites.

Due to limited staff to assist in the maintenance of Avra Valley and the perception that these properties are “vacant lands” or natural open space, a specific maintenance plan has not been prepared for the Avra Valley properties. According to maintenance staff, approximately one-half of the City-owned property is stabilized and is relatively weed-free. The maintenance crew typically cuts weeds on the other half of the City-owned property approximately two times a year.

Specific Maintenance Issues

Various maintenance situations have arisen and are addressed each year. In 1992, the City’s Safety Coordinator received a complaint from a neighboring Avra Valley property-owner who reported a City-owned parcel was being trespassed upon and used as a shooting range. During the safety inspection, numerous locations where signage and fencing had been stolen or destroyed were noted. The Safety Coordinator recommended to Tucson Water that access to the City properties be closed by the installation of fences, berms, or ditches (where also needed for stormwater control). In addition, it was recommended that City-owned properties be posted with “private property” signage.

In response to this recommendation, an action plan was prepared to address safety concerns. About one hundred forty miles of fence currently surrounds the City's properties. In order to post the land against trespassing to legal specifications, signs need to be placed every three hundred feet along property lines, necessitating over 2,400 signs. Due to the costs involved, it was determined that post-and-cable fencing and signage would be installed at the entrances to all City-owned lands but not along the entire length of the property lines. The installation of this access fencing and signage has been an ongoing program. Conversion of the "private property" signs to a smaller size have made them less lucrative to steal.

In the Spring of 1994, an insurance inspection noted that the vacant farm structures on three City-owned properties had been vandalized and were in danger of becoming safety hazards. Problems associated with the vacant structures included sagging ceilings, debris, pack rat nests, and bee hives. In particular, the infestation of rats is a concern due to the hanta virus which has been noted only five miles from City-owned lands.

Another important maintenance issue to be addressed as time and money allow is the nonoperational, inactive agricultural wells that have equipment remaining on site. The Avra Valley farms typically were acquired with a number of wells for irrigation and domestic use. Each nonoperational, inactive well generally includes a concrete pad with a water pump and a natural gas engine to run the pump. Much of the pumping equipment was deactivated and removed although in some cases equipment was vandalized or stolen.

In December of 1993, Tucson Water received two citations from Pima County Department of Environmental Quality for petroleum-contaminated soils near nonoperational, inactive agricultural well sites in the Avra Valley. The sites have been mitigated through the removal and treatment of the contaminated soil. The contamination was caused prior to purchase by Tucson Water by farmers draining their pump engines onto the ground while changing the oil. This is a common practice by farmers and continues to this day on other active farms.

A visual assessment of the nonoperational, inactive agricultural well sites conducted in January 1995 found that 24 out of 67 wells surveyed were considered clean with no soil contamination from previous agricultural uses or derelict equipment remaining. Thirteen of the nonoperational well sites still had an engine on the pad. Tucson Water estimates that 60 percent (43 sites) of the nonoperational, retired wells on City-owned property may require mitigation due to soil contamination from previous agricultural uses. Mitigation is expensive because the soils which are removed require appropriate treatment and disposal.

Tucson Water estimates a typical site with soil contaminated from previous agricultural uses would cost \$4,000-\$10,000 to mitigate through traditional techniques, including excavation, hauling, and soil treatment as well as the hauling and compacting of new backfill. Total cost for remediation of the 43 potentially contaminated sites could cost between \$175,000 to \$450,000.

Bioremediation is an alternative remediation technique which may be appropriate for sites with soil contamination from previous agricultural uses, with a much lower cost of \$300-\$1,000 per site (\$1,300-\$43,000 total cost for the 43 sites). Bioremediation is a process where specific microorganisms are injected into contaminated soils (along with oxygen and nutrients). The microbes consume the organic contaminants and transform them into inert byproducts such as carbon dioxide and water. Staff from Tucson Water and the Office of Environmental Management are currently investigating the potential of bioremediation in the Avra Valley.

G. CURRENT LEASES AND REQUESTS FOR USE OF CITY-OWNED PROPERTY

Tucson Water Department currently leases two portions of Avra Valley land parcels and has additional agreements for use of other properties. The current leases are with the Tucson Adobe Block Company on 20 acres of the Gin Farm at a lease rate of \$825.00 per month, and the Tucson International Modelplex Park Association (for model airplane hobbyists) on 160 acres of the Davison Farm for the lease rate of \$20.00 per year.

Periodic use of City-owned property in Avra Valley without a fee occurs through agreement with Tucson Water. Users include the SWAT Team of the Tucson Police Department that uses the abandoned buildings to practice maneuvers, the University of Arizona that does rainfall monitoring, and the Federal Department of Agriculture that tracks bee migration.

The City currently has no institutionalized procedure for accepting or approving land use requests. Some of the requests for use are made very informally via telephone and some applicants provide written requests of varying specificity. The requests typically are reviewed in-house by Tucson Water in consultation with the Real Estate Division and the Attorney's Office on an as-needed basis. Figure 3 displays locations of existing land uses and recent requests. A description of the leases and requests for use follow.

REQUESTS FOR USE AND PROPOSED PROJECTS MAP, FIGURE 3 LINK

Current Leases of City-Owned Property

Tucson Adobe Company. The Tucson Adobe Company leases 20 acres from the City of Tucson to produce stabilized adobe blocks. The Company mixes soil from the area with straw, concrete, and water in a machine which extrudes adobe blocks for construction. The blocks are dried on site and then delivered to construction sites. The lease was bid and awarded in 1983. The lease was renewed per the terms of the agreement in 1993 for another ten years. The lessee paid the City a graduating rent from \$300.00 a month for the first year to \$550.00 a month after ten years. The current rent is \$825.00 a month.

Tucson International Modelplex Park Association Request. In June 1995, the Mayor and Council approved a lease by the Tucson International Modelplex Park Association (TIMPA) for property in the Avra Valley. This facility will serve model airplane hobbyists who fly miniature planes by remote control. TIMPA's requirements include the ability to clear land for a paved runway (1,000 feet by 50 feet) and to utilize an existing water well on the site. The initial request by TIMPA was submitted in January 1992 and included proposed future facilities for model car racing, soap box racing, dog training, and a model boat pond although these activities have not been formally approved by the City.

Through discussion with the City, it was determined that TIMPA could lease 160 acres of City-owned property known as the Davison Farm for the rental price of \$20.00 a year. This is a fair market rate based upon the State Land Department rate for grazing leases. The property includes a three-bedroom house in poor condition, a large metal building, and an inactive well. TIMPA is a 501C3 Federal Tax Exempt non-profit corporation.

In order to prepare a lease, the Real Estate Division required proof of insurance, incorporation documents, a copy of the non-profit status forms, building and landscaping plans, and a financial capability statement. TIMPA has begun renovation and construction of its facilities.

Current Requests for Use of City-Owned Property

Dragstrip Request. In June 1993, Desert Thunder Dragway of Tucson wrote a letter to the Real Estate Department requesting lease of City-owned land in Avra Valley for a dragstrip. A quarter-mile track with runout areas (enough track to come to a safe stop) and associated facilities require 250-300 acres. The facility would include full lighting for night time racing, and would require power at the property line and a water supply equivalent to about 1,000 gallons per day. The area of pit parking needed for the race cars and rigs is estimated at approximately 25 acres and the parking area for spectators would need approximately 35 acres.

The applicant has expressed a willingness to work with other recreational users, in particular TIMPA, to develop a multi-use facility. Responsibility for permits for hazardous waste storage and disposal (gasoline, solvents) as well as wastewater issues for such a development would need to be placed on the tenant(s) and not the City of Tucson. The City, however, would be responsible for periodic inspections to assure that management of such a facility was in compliance with all appropriate regulatory agencies.

Racetrack Request. The Sahuaro National Raceway group has proposed installation of a dirt circle race track and a paved road racing course. The facility would be similar to the Desert Thunder proposal and the two groups may combine their requests.

Avra Valley Fire Station Request. In May 1994, the Water Plant Supervisor received a phone call from the Chief of the Avra Valley Fire Department. The Fire Department was interested in using about one-half acre of land near the Anway Road and Tucker Road area (AF Well Site 17) for a volunteer fire station. The Chief requested the use of the land be donated to the Avra Valley Fire Department. In exchange, the Fire Department agreed to supply fire protection to City property within the Fire District. Tucson Water agreed to investigate the request but noted that they could not provide access to a water source.

Grazing Request #1. In October 1994, an Avra Valley rancher wrote a letter to Tucson Water requesting a lease for two and one-half sections (1,280 acres) of City-owned property to graze cattle. The request is to lease the land at \$250.00 a year for at least five years. Access to water is not needed because the cattle are able to drink on his adjacent properties. This request was reviewed by the Real Estate Division and denied based on the lease of part of the property to the Tucson International Modelplex Park Association (TIMPA).

Private Sector Restoration Proposal. In December 1994, a land restoration business made a proposal to the Mayor and Council Environmental Subcommittee for restoration of the City-owned property in Avra Valley. Wildlands Restoration estimates that about 10,000 acres of the 23,000 acres owned by the City is still covered with tumbleweeds. A proposal was made to revegetate these areas with native species by utilizing 25-30 types of seed. Approximately 500 acres of land could be revegetated each year. It was estimated that the cost to seed the acreage is about \$100.00 per acre (or \$1,000,000 for 10,000 acres.) The proposal does not say if this dollar amount would include any services after seeding. The consultant states it is possible to lease the land for grazing the second year after seeding.

Private Sector Management Proposal. At the December 1994 Environmental Subcommittee Meeting, a proposal was made for management of all of the City-owned land in Avra Valley by the private sector. The proposal identifies the issues which need to be addressed including revegetation to abate dust and weed infiltration, trespassing of livestock, wildcat dumping of refuse, and safety hazards such as abandoned structures. The proposal suggests the use of alternative management techniques such as seasonal grazing and controlled burning to reduce excess vegetative cover.

The management program as proposed by the applicant would include an inventory of existing conditions, and a monitoring program to determine sites which require stabilization and/or clean-up. The monitoring program would include a monthly activity report and an annual status report. The proposal does not say if the applicant would provide the actual revegetation and clean-up, and does not state a price for those services.

University of Arizona, Office of Arid Land Studies Request. In January 1995, the Bioresources Research Facility at the Office of Arid Lands made a request to Tucson Water to use some of the City's property in Avra Valley to test a seeding drill. The U of A is working with a company evaluating a no-till drill which would plant seeds into stubble or pasture land without disturbing much soil. The U of A is willing to seed some of the Avra Valley properties with grass or grains at no cost if the City purchases the seed. The request is on hold pending the repair of the seeding drill.

Grazing Request #2. In the Spring of 1995, a request was made to lease City-owned property known as the Buckelew Farm and the Growers Finance/Morse Farm for grazing. The request was made by a cattle rancher with property to the north of the requested properties. The rancher states that the trespassing of horses and cattle on City-owned parcels encourages trespassing on his properties also. The rancher agreed to maintain the fencing of the City-owned parcels, and is able to provide his own water supply for his cattle.

Arizona Soil Conservation Service Request for the Brawley Wash Project. The Arizona Soil Conservation Service, in conjunction with the Pima Natural Resource Conservation District, (PNRCD) proposes the construction of a grade-control structure along the Brawley Wash. The purpose of the structure is to stop the soil erosion occurring along the Brawley Wash. A brochure published by the PNRCD states that severe overgrazing by cattle during the 1890's began a process of erosion which continues to this day along the Brawley Wash and its tributaries.

The structure is proposed to be built on BLM property south of Ajo Way, just west of Three Points. The structure will impound silt behind it; over time, the incised channels of the Brawley Wash would fill with soil. Other potential benefits stated in the brochure include the reduction of flooding in the Avra Valley and Marana, improved range and wildlife habitat, and increased incidental groundwater recharge.

The implementation of this project will impound stormwater runoff on the City owned parcel known as the Duval/Pennzoil farm. This project is being evaluated by Tucson Water.

II. SUMMARY OF RECENT PLANS, REPORTS, AND PROJECTS

The following are short summaries of the various plans, reports, and projects with implications for the City-owned land in the Avra Valley.

A. TUCSON WATER DEPARTMENT

1. Tucson Water Resources Plan -- 1990-2100 -- Planning Background Report, CH2MHill for Tucson Water, April 1989

Summary: The intent of the plan was to articulate a broad community consensus on important water issues. Among the goals of the plan was compliance with all requirements of the Groundwater Management Act including demonstrating a “100-year assured water supply.” Issues related to the Avra Valley identified in the plan included the use of the aquifer to store Central Arizona Project (CAP) water, stormwater, and reclaimed water through artificial recharge. In-lieu recharge credits to be acquired as the result of the purchase and retirement of farmland were considered to be part of the assumed long-range supply.

Implications for City holdings in the Avra Valley study area: Injection recharge requires treated/high quality water and an aquifer with good hydraulic conductivity and sufficient storage capacity.* These hydrologic conditions are present in substantial portions of the Avra Valley. However, injection recharge of untreated CAP water, treated wastewater (primary or secondary treatment), or reclaimed water is not efficient due to the numbers of suspended solids in these types of water. Surface infiltration recharge through basins is feasible in several locations throughout Avra Valley.

* In November, 1995, the City of Tucson passed the Citizens’ Water Protection Initiative (Proposition 200) which supersedes all previously published plans and reports. This law, discussed in the subsequent item 7, stipulates certain uses for CAP water and will govern the quality of water used for injection recharge.

2. Tucson Recharge Feasibility Assessment - Phase A, CH2MHill for Tucson Water, August 1989

Summary: The purpose of this report was to evaluate the potential to recharge CAP water and effluent from wastewater treatment plants.

Implications for City holdings in the Avra Valley study area: Avra Valley was determined to have the appropriate hydrogeologic conditions to be suitable for both injection well and surface infiltration basin recharge. In addition, Tucson Water's distribution system and CAP water supply facilities would need to be expanded in order to recharge treated CAP water with injection wells.

3. Tucson Recharge Feasibility Assessment - Phase B, CH2MHill for Tucson Water, May 1989

Summary: The purpose of the Phase B study was to gather and evaluate information about recharge through the selection and implementation of representative pilot projects. Recharge sites were selected for the entire Tucson basin and include sites in the Santa Cruz River, Pantano Wash, Tanque Verde Wash, Rillito River, Canada Del Oro, and Brawley Wash.

A site was selected for a pilot project on the City-owned parcel known as Duval Farm, about 1 and 1/2 miles south of Three Points (see the Land Use Requests and Proposed Projects map, Figure 3.) This project demonstrated the capability of the area to recharge CAP water and identified a larger area, paralleling the Brawley Wash and known as Brawley/3 Points, for potential recharge. This large area includes several City-owned parcels and was determined to be hydrologically suitable for surface recharge through spreading basins.

An additional area, known as Area #4, was identified as being a hydrologically suitable site for a new wellfield. In terms of recharge, this would be an area appropriate for well-injection. The site, in the east-central portion of the study area, does not include any City-owned land.

Implications for City holdings in the Avra Valley study area: It is possible to recharge treated CAP water by surface recharge or by injection in the Avra Valley. However, it would be expensive to develop the water conveyance facilities to bring treated CAP water from the Water Treatment Plant to the Avra Valley.

4. Groundwater Savings Projects - Opportunities for Utilizing Central Arizona Project Water, Tucson Water, July 1994

Summary: This report evaluated potential opportunities for the City to participate in groundwater savings projects with other entities. If the City provided CAP or effluent, Tucson Water would get stored water credits for each acre foot of groundwater use that was replaced with in-lieu water. These stored water credits

can be applied toward assured water supply requirements. The credits may be acquired indefinitely and can be used to pump groundwater at any time.

Implications for City holdings in the Avra Valley study area: Several agricultural enterprises have expressed interest in this program. BKW Farms, located within Avra Valley, and the City implemented a groundwater savings project in 1995.

5. CAP Use Study for Quality Water, Dames and Moore for Tucson Water, ongoing

Summary: The CAP Use Study for Quality Water was authorized by the Mayor and Council to evaluate the full range of options required to meet Tucson's need for quality water now and in the future. The study was initiated in response to discolored water and associated problems that occurred following the change from groundwater to CAP water. Alternative treatments and uses for CAP water were examined, and the CAP Use Plan was adopted by Mayor and Council in September, 1995. The plan includes:

- Recharge of CAP water at five sites (including Avra Valley).
- Blending of CAP water with groundwater (with pilot studies to determine a mix compatible with the system and customers' desires).
- The continued study of enhanced treatment to improve the taste and hardness of CAP water.
- The continued replacement of old water mains.

Implications for City holdings in the Avra Valley study area: The preservation of the water quality and quantity within the Avra Valley study area becomes increasingly important with the potential to recharge CAP water and the recommendation to blend CAP with groundwater.

6. Wetland/Recharge Site, Tucson Water, ongoing

Summary: Tucson Water has identified an area in the vicinity of Manville Road as potentially suitable for development of a joint wetland and recharge project (see the Land Use Requests and Proposed Projects map, Figure 3.) If implemented, construction of a new pipeline would be necessary to bring secondary effluent to the area for recharge.

Implications for City holdings in the Avra Valley study area: Portions of the Nichols, Jarvis and Bowden City-farm properties could be involved if this project is implemented.

7. Central Avra Valley Storage and Recovery Project, Tucson Water, ongoing

Summary: In November 1995, the Citizens' Water Protection Initiative (Proposition 200) was passed which requires Tucson Water to recharge CAP water and refrain from serving treated CAP water for five years (or until the treatment and distribution system is upgraded to serve water of equal quality to Avra Valley groundwater.) One proposal by Tucson Water is to develop a surface recharge facility and wellfield in the Avra Valley on portions of the Bowden, Davison, and Cactus-Milewide Farms. Untreated CAP water would be diverted from the CAP aqueduct and conveyed to the recharge facility. The proposed wellfield would be located in the same area and would include the development of 25 recovery wells. After the water is pumped it would be conveyed to the Hayden-Udall Treatment Plant prior to distribution.

Implications for City holdings in the Avra Valley study area: While this is only one of several options being investigated by Tucson Water, the proposed project could utilize portions of the Avra Valley and illustrates the importance of the City-owned properties for future and potential water projects.

B. PIMA ASSOCIATION OF GOVERNMENTS

1. Application of Historic Well Closure Information for Protection of Existing Wells - Final Technical Report, Pima Association of Governments, December 1992

Summary: The purpose of this project was to examine existing cases of public-supply well contamination in order to determine the best approach for wellhead protection in Tucson and Pima County. Factors which were important in evaluating a well's susceptibility to pollution were proximity to a major recharge source, shallow or perched groundwater, and presence of land uses that might contribute contaminants.

Landfills and unrestricted discharges of waste from industrial areas were identified as the most significant known sources of VOC (volatile organic compounds). Leaking underground pipelines and leaking underground storage tanks contribute to petroleum contamination. Irrigated agriculture, sewage treatment plants, and septic systems are likely sources of nitrate contamination.

Implications for City holdings in the Avra Valley study area: PAG recommends that regional wellhead protection should be established to protect the areas that are most susceptible to ground-water contamination. These areas include recharge zones within the Avra Valley.

2. Avra Valley Water Quality and Pollution Source Assessment - Final Report, Pima Association of Governments, May 1993

Summary: The Avra Valley Water Quality and Pollution Source Assessment Report evaluates the pollution from land uses within Avra Valley by analyzing available information on contaminated wells, surrounding land uses, floodplain ratings, and groundwater pollution susceptibility.

Approximately 80 percent of the population of Avra Valley resides in non-sewered areas. Septic tank systems are a potential source of nitrate, total dissolved solids, microorganisms, and trace organics from household cleaners. Septic systems may have contributed to high values of total dissolved solids and nitrates at two down-gradient public supply wells but no known groundwater quality degradation may be solely attributed to septic tank systems.

Rangeland activities are thought to have a low impact on groundwater quality because of the large acreage involved. A concentration of cattle such as an impoundment area could impact groundwater.

Implications for City holdings in the Avra Valley study area: Future land uses should be located away from areas which are highly susceptible to groundwater contamination. Wells within agricultural areas or in areas where subsurface contaminant flows occur are likely conduits of contamination to the regional aquifer. PAG recommends that such wells be abandoned according to State regulations.

3. Incorporation of Wellhead Protection Strategies into Planning Operations of a Southwestern Water Utility, Prepared for Tucson Water by Pima Association of Governments, April 1994

Summary: The goal of this project was to assess the contamination risks to Tucson Water supply wells and to assist the utility in implementing wellhead protection strategies. Potential sources of public-supply well contamination were mapped including landfills, industrial areas, leaking underground storage tanks, wastewater treatment facilities, and irrigated agriculture.

Most of the public-supply wells with the lowest risk of contamination reside within the Avra Valley and are at least one-half mile from the nearest upgradient agricultural area or effluent disposal area. The implementation of various land use planning tools which could improve well protection were discussed.

Implications for City holdings in the Avra Valley study area: Wellhead protection options include:

- Request Pima County, Oro Valley, and Marana inform Tucson Water of any new development planned near a well or recharge area.

- Encourage the Nature Conservancy to purchase properties or conservation easements in recharge areas for open space and wildlife preservation.
- Propose to Mayor and Council that the City adopt a formal policy stating that City-owned lands in Avra Valley around supply wells and within recharge areas will not be sold for purposes of industrial development, landfills, or other uses that might impact ground-water quality.
- Work with local government agencies to propose that Wellhead Protection Overlay Zones be established for recharge areas outside the City limits.
- The City or other agencies could purchase properties and preserve them as open space to preserve water quality.

4. Water Quality - State of the Region Report, Pima Association of Governments, December 1994

Summary: The goal of this report was to bring together written information on various studies and regulations regarding local water quality and to analyze the current local issues.

Implications for City holdings in the Avra Valley study area: The best method for providing wastewater treatment facilities for Avra Valley needs to be determined. The northern area is being subdivided and small wastewater treatment plants are being installed which could lead to groundwater contamination.

5. Integrating Land Use Planning and Water Quality Planning - A Guide for Planners and Local Officials, Prepared for Pima County by Pima Association of Governments, April 1994

Summary: The purpose of this report is to describe the potential impacts of land use and development on water quality, and define land use planning strategies to protect groundwater quality. This report identified eleven land uses as potential sources of contamination in the Avra Valley and Tucson basin:

- Irrigated agriculture.
- Animal impoundments.
- Turf areas.
- Landfills.
- Large disturbed areas.
- Dry wells.
- Underground storage tanks.
- Septic tank systems.
- Surface impoundments.
- Commercial and industrial uses.

Implications for City holdings in the Avra Valley study area: In order to protect the water resources from potentially-polluting uses, PAG recommends eliminating the siting of potentially-polluting land uses from sensitive recharge areas and adjacent to supply wells. Land use planning and site design tools can be used to protect groundwater. The following is a summary of these tools:

- Zoning - the easiest way to use zoning to protect water resources is for the zoning on an area to allow only those land uses which do not impact water resources.
- Use Prohibitions - within a given zone, certain uses are excluded. This typically means the use of pesticides or other noxious compounds are restricted as well as uses such as auto repair, agriculture, waste storage and incineration.
- Overlay Districts - areas designated to protect sensitive resources through the use of performance or design standards.
- Cluster Zoning - allows developers to increase density in some areas in exchange for preservation of open space in other areas.
- Subdivision Ordinances - can be used to require site plan review and design standards to protect groundwater.
- Design Standards - can regulate the use of materials and workmanship such as requirements for septic tanks and underground storage tanks.
- Performance Standards - require that development meet a certain level of performance for items such as stormwater or wastewater management.
- Siting Criteria - ensure that facilities are appropriately located and designed for that site.
- Special Use Review and Permits - usually involves a special review by a board of professionals to issue a special permit for certain uses.
- Site Plan Review - is a special review for design in sensitive areas such as in floodplains.
- Transfer of Development Rights - allows a property owner to trade development rights on one piece of property for permission to develop on another parcel.
- Property Transaction Requirements - regulates existing polluting uses by requiring upgrades if a facility is ever sold, transferred, expanded, or changed.
- Registration - of regulated activities such as private wells.
- Land Purchases - of areas to protect sensitive lands.
- Regional Planning - can be used to ensure that all of the communities in an area adhere to the same development regulations.

6. Regional Aviation System Plan (RASP) Update, Pima Association of Governments, June 1995

Summary: The RASP Update provides a comprehensive assessment of the region's aviation system. The study identifies, quantifies, and prioritizes aviation-related development over the next 20 years.

The use of Ryan Airfield relieves some of the demand on the Tucson International Airport runways. Besides business-class use, pilot training for several major international airlines occurs at Ryan Airfield and accounts for a significant amount of its activity.

Implications for City holdings in the Avra Valley study area: Ryan Airfield was identified as having several facility deficiencies including the need for a terminal building, additional aircraft storage, and additional ramp space. TIA is developing plans to expand Ryan Airfield to include the City-owned parcel to the west (see the Land Use Requests and Proposed Projects map, Figure 3.) The expansion of Ryan Airfield has the potential to increase waste with environmental implications.

C. OTHER JURISDICTIONS AND AGENCIES

1. Avra Valley Viewshed Project, Arizona-Sonora Desert Museum, ongoing

Summary: The purpose of this project is to analyze and influence land use practices in the Avra Valley to preserve the viewshed and operational environment of the Arizona-Sonora Desert Museum. The first phase of the project is to perform an inventory of existing conditions with data entered on a GIS system. The second phase is to develop strategies for reducing negative aesthetic and ecological impacts in the viewshed. The last phase is to monitor change and, as new development is proposed, recommend specific mitigation actions. See the Land Use Requests and Proposed Projects map, Figure 3, for a preliminary assessment of the viewshed location.

Implications for City holdings in the Avra Valley study area: Many of the City-owned parcels are within the Arizona-Sonora Desert Museum's viewshed. In addition, some land uses would be incompatible with the operation of the Desert Museum due to the noise, lights, and increase in traffic in the area. This international visitors' attraction contributes to the economic vitality of the region. Land uses proposed for City-owned parcels have the potential to impact the operations and viewshed of the Arizona-Sonora Desert Museum.

2. Northwest Tucson Active Management Area Replenishment Program Concept Report; Metropolitan Domestic Water Improvement District, BKW Farms, Pima County, Town of Marana, and Town of Oro Valley; February 23, 1994

Summary: Other water management entities besides Tucson Water have an interest in recharge of CAP water and effluent. This report investigates three projects to recharge water. The three projects are the Avra Valley Project, the Lower Santa Cruz River Flood Control and Replenishment Project, and the Canada del Oro Recharge Demonstration Project.

Implications for City holdings in the Avra Valley study area: The Avra Valley Project is planned for 80 acres north of the Avra Valley Airport on an abandoned sand and gravel pit. Ultimately, four or five spreading basins of approximately five acres each would be built. It is anticipated that 5,000 acre feet of CAP water per year would be recharged during the pilot phase. When the facility is fully operational, it is anticipated that 15,000-30,000 acre feet would be recharged. See the Land Use Requests and Proposed Projects map, Figure 3, for location of the project.

3. Tohono O'odham Nation - Papago Water Supply Project - Environmental Assessment of the Schuk Toak Development Plan, US Bureau of Reclamation, November 1988

Summary: The proposed project is designed to utilize water rights awarded to the Tohono O'odham Nation for agricultural use. The Nation's allocation is a total of 66,000 acre-feet of water (37,800 acre-feet of CAP water and 28,200 acre-feet of water suitable for agriculture.) In addition, 16,000 acre-feet of water was allocated to the Schuk Toak District of the Tohono O'odham Nation. A section of the Schuk Toak District falls within the Avra Valley.

The preferred area to develop an irrigated farm is situated on 2,580 acres of land in the southeast corner of the Garcia Strip (see the Land Use Requests and Proposed Projects map, Figure 3.) The plan calls for a fenced mitigation area of 450 acres to be established adjacent to the reservation's northern boundary. The purpose of the mitigation area is to create an area of enhanced vegetation for wildlife by excluding grazing and discouraging other activities such as off-road vehicle use.

Implications for City holdings in the Avra Valley study area: The mitigation area is adjacent to City-owned properties known as the Wallis Farm and the 98 Farm Company. The opportunity exists to coordinate the use of the City-owned properties with the Schuk Toak project for wildlife habitat and link to the Bureau of Reclamation Wildlife Mitigation Preserve and Tucson Mountain Park.

4. Water Harvesting Agrisystem -- An Alternative to Groundwater Use in the Avra Valley Area, Arizona; Office of Arid Lands Studies, University of Arizona, November 1984

Summary: In the early 1980's, a five acre water harvesting agrisystem was developed on City-owned retired farmland (see the Land Use Requests and Proposed Projects map, Figure 3.) The water harvesting system was developed to collect rainwater for the irrigation of various species of plants. The water harvesting project was established to demonstrate a potential and economic use for retired farmland, and to indicate the City's commitment to water conservation and land management by determining the feasibility of farming without the use of groundwater.

Implications for City holdings in the Avra Valley study area: This project is considered a success by the University of Arizona. As a part of the study, areas of City-owned property suitable for water harvesting were mapped.

III. INVENTORY OF EXISTING CONDITIONS

The following is a brief description of the existing conditions of the Avra Valley study area. The description is based upon the corresponding inventory maps as referenced. The inventory maps provide information on the overall context and facilities of the area which assist in determining appropriate potential land uses.

A. PROPERTY OWNERSHIP AND BOUNDARIES.

One third of the Avra Valley study area is owned by private individuals and two thirds by various public or private agencies (see the Land Ownership map, Figure 4). The largest public land owner within this area is the State Lands Department with over 76,000 acres. The City of Tucson's 23,000 acres are in non-contiguous parcels spread over a linear distance of 25 miles from the Pima/Pinal County line south to Ajo Way.

B. EXISTING LAND USE AND DEMOGRAPHICS.

Existing land uses within the Avra Valley are predominately cattle grazing and active agriculture (see the Existing Land Use map, Figure 5). Cattle grazing occurs on private property and on lands leased from State Lands and the Bureau of Land Management (BLM). Approximately three-fourths of the lands owned by State Lands and the BLM are leased for grazing; most of the grazing leases occur in the southern part of the Valley. Active agricultural uses are concentrated in the northern part of the study area near the Town of Marana. In addition to homes on farms

LAND OWNERSHIP MAP - FIGURE 4 LINK

EXISTING LAND USE - FIGURE 5 LINK

scattered throughout the Valley, residential development includes several small, low density subdivisions with a predominance of mobile homes.

A small amount of commercial and industrial land use is concentrated along the major transportation corridors - Interstate 10 and Ajo Way (State Highway 86) - within the study area. One commercial use is Ryan Air Field located on south Ajo Way. Ryan Air Field was built as a training field for pilots in 1940. The City of Tucson (not Tucson Water) acquired Ryan Air Field in 1959 and transferred management of it to the Tucson International Airport Authority (TIA.)

The following chart describes 1990 characteristics of the Avra Valley in relationship to the City of Tucson. Characteristics described include population, housing and income information.

Avra Valley Study Area Demographics from 1990 Census

	Avra Valley		City of Tucson	
	NUMBER	% OF TOTAL	NUMBER	% OF TOTAL
POPULATION	14,229		405,390	
Under 18 years	4,384	30.8%	98,889	24.4%
18 - 65 years	8,605	60.5%	255,311	63.0%
65 years plus	1,240	8.7%	51,190	12.6%
HOUSING UNITS	5,609		183,338	
Owner-occupied units	4,122	84.6%	83,687	51.4%
Renter-occupied units	749	15.4%	78,998	48.6%
Vacant	648	11.6%	20,653	11.3%
Single-family detached	1,556	27.7%	82,421	45.0%
Multi-family units	76	1.4%	68,189	37.2%
Mobile Homes	3,977	70.9%	14,403	7.9%
MEDIAN FAMILY INCOME	\$25,853		\$27,208	
MEAN HOUSING VALUE	\$49,597		\$71,321	
MEAN RENTAL PER MONTH	\$169		\$377	

C. PROPOSED LAND USE - Pima County Comprehensive Plan.

The Pima County Comprehensive Plan was adopted in 1992 and provides a long-range guide to growth and development in unincorporated Eastern Pima County (see the Pima County Comprehensive Plan and Marana General Plan map, Figure 6.) The Avra Valley study area falls within two planning units called subregions: Tucson

PIMA COUNTY COMPREHENSIVE PLAN AND MARANA MAP LINK
FIGURE 6

Mountains and the Avra Valley-Tortolitas. The predominate planned land use categories for City-owned property within the Avra Valley are the following:

- Resource Conservation - essentially coincides with the Brawley Wash floodplain. Allowed land uses include low density residential or open space to recognize environmental and safety issues. Maximum residential density is one unit per three acres (0.3 RAC).
- Low Intensity Rural - planned for most of the study area that is not within the floodplain, incorporated areas, or other boundaries. Allowed land uses include low density residential consistent with the characteristics and infrastructure of rural areas. Maximum residential density is one unit per three acres (0.3 RAC).
- Resource Productive - some of the areas around the Town of Marana have been designated for ranching and mining uses and also allow low density residential.
- Medium Intensity Rural - for areas where development has taken place in the Avra Valley. Allowable land uses include low density residential near a rural activity center.

Town of Marana General Plan. The Town of Marana General Plan, adopted in 1987, guides the long-range development of the area. See the Pima County Comprehensive Plan and Marana General Plan map, Figure 6. Marana has designated a Sphere of Influence for an area surrounding its town limits. The purpose of the Sphere of Influence is to have influence on physical, social, political and environmental impacts which directly affect the Town. City-owned property within the Avra Valley is not within the boundaries of the current Marana Town limits; however, City-owned property is within the boundaries of Marana's designated Sphere of Influence.

D. ZONING.

The predominate Pima County zoning districts within the Avra Valley study area are Institutional Reserve (IR) and Rural Homestead (RH) (see the Existing Zoning map, Figure 7). These are low-density rural zones with the majority of lands zoned IR belonging to State or Federal agencies. The various zoning districts and the residential units allowed within the Avra Valley study area are listed below from the least to the most intensive:

- Institutional Reserve (IR) - one unit per 36 acres
- Rural Homestead (RH) - one unit per five acres
- Rural Residential (GR-1) - 1.21 units per acre
- Suburban Ranch (SR) - 3.3 units per acre
- Suburban Homestead (SH) - 1.21 units per acre
- Single Residence (CR-1, CR-2, CR-3) - 1.21 units to 5.4 units per acre

EXISTING ZONING MAP - FIGURE 7 LINK

- Light Industrial/Warehousing (CI-1)
- General Industrial (CI-2)
- Heavy Industrial (CI-3)

The City-owned property in the Avra Valley is zoned Rural Homestead (RH) by Pima County. The RH zone is a low density residential zone with the potential for limited commercial and agricultural uses through Conditional Use Permits. The Conditional Use Permit process requires public hearings with various administrators and boards. The more intensive the requested use, the more extensive the hearing process.

E. 100-YEAR FLOODPLAIN AND POTENTIAL TRAIL SYSTEM.

Approximately 15,400 acres or two-thirds of the City-owned property within the Avra Valley is within the 100-year floodplain (see the 100-Year Floodplain and Potential Trail System map, Figure 8). Agriculture, grazing, and some outdoor recreation are land uses allowed within floodplains. Urban and rural uses require considerable expenditures for floodcontrol improvements. Without floodplain mitigation, only land uses with a minimal investment of infrastructure are appropriate.

The Eastern Pima County Trail System Master Plan designates potential trails for the Avra Valley area. Designated “first priority” trails on City-owned property include:

- Santa Cruz River trail (#8), to be developed within a linear park to serve all trail user groups.
- Brawley Wash trail (# 11) for foot and horse use.
- Black Wash trail (#10) for foot and horse use.

Pima County Park and Recreation Department has no plans to develop any of these trail segments in the near future. The major trail being developed within the Avra Valley is the CAP trail (#3) along the canal.

F. VEGETATION AND WILDLIFE.

The Critical and Sensitive Wildlife Habitat map developed in 1986 was an inventory of prime habitat (mostly along washes) for the Tucson region. The majority of City-owned Avra Valley property was not designated as wildlife habitat by this study, probably due to the clearing of native vegetation from the property for farming. Some City-owned property along the Blanco Wash, the Brawley Wash, and the Santa Cruz River was classified as Class I or Class II Habitat (see the Vegetation and

FLOODPLAIN & TRAILS MAP - FIGURE 8 LINK

Wildlife map, Figure 9). Class I and Class II habitats support a diversity of species and large numbers of individuals.

Another important feature illustrated on this map is Wildlife Movement Corridors. These corridors have traditionally been used by large mammals to move between isolated patches of habitat and between large natural areas that surround Tucson. Wildlife corridors in the Avra Valley allow wildlife to travel from Saguaro National Park and Tucson Mountain Park to the Roskrige Mountains to the west.

The Wildlife Movement Corridors are assisted by wildlife crossings located along the CAP Canal and on the Bureau of Reclamation's Wildlife Preserve. The City-owned properties known as Davison Farm, Cactus Company Farm, 98 Farm, and Wallis Farm appear to be of particular importance to this wildlife movement system due to their location between the Roskrige Mountains to the west and the public preserves and wildlife crossings on the east side of Avra Valley.

The Avra Valley provides habitat for threatened, endangered and sensitive species of plants and animals. The Arizona Game and Fish Department provided the following list of these plant and animal species which can be found on City-owned property.

**List of Threatened, Endangered, and Sensitive Species in the Avra Valley
from the Arizona Game and Fish Department**

<i>COMMON NAME</i>	<i>STATUS</i>
Gila monster	"Sensitive" by USDA Forest Service.
Great Plains narrow mouthed toad	State Candidate - Threatened Native Wildlife list.
Pima pineapple cactus	"Endangered" species by the US Fish and Wildlife Service.
Pringle lip fern	"Sensitive" by USDA Forest Service.
Sonoran desert tortoise	Category 2 Candidate for the Threatened or Endangered Species List by the US Fish and Wildlife Service.
Thornbur fishhook cactus	Salvage Restricted by AZ Native Plant Law.
Tropical kingbird	State Candidate - Threatened Native Wildlife list.
Tumamoc globeberry	"Sensitive" by USDA Forest Service

Additional wildlife species common to the Tucson area find food and shelter in areas of the Avra Valley. A list of potential animal species supplied by the Natural Resource Conservation Service (formerly known as the Soil Conservation Service) includes mule deer, javelina, mourning dove, Gambell's quail, roundtail ground

WILDLIFE & VEGETATION MAP - FIGURE 9 LINK

squirrel, blacktail jackrabbit, antelope jackrabbit, desert cottontail, Merrian kangaroo rat, white-throated wood rat, and desert iguana. Many native plant species, including mesquite, ironwood, palo verde and acacia, as well as wildflowers and cacti find Avra Valley soils and climate complementary to their needs.

G. EXISTING AND POTENTIAL POLLUTION SOURCES.

Existing and potential pollution sources in the Avra Valley include active and retired agricultural areas, sewage effluent disposal areas, facilities with leaking underground storage tanks, industries with a high hazard code as determined by the Department of Environmental Quality, gravel pits and quarries. These are referenced on the Existing and Potential Pollution Source map, Figure 10.

PAG's Pollution Source Assessment Report identified nitrate from human activities as the major pollutant impacting groundwater quality. Disposal of treated effluent in the Santa Cruz River and agricultural activities in the Marana area were stated as the nitrate contributors. Other agricultural pollutants include pesticides and fertilizers as well as the application of sludge on farm fields. Industries with a high hazard code are primarily located in the northern Avra Valley and include pest control services, printers, and paint shops.

The City-owned properties in the Avra Valley are relatively free from on-site pollution sources. By retiring the farmlands, the City has diminished the potential for nitrate pollution from agricultural pesticides and fertilizers, and from septic systems.

H. INFRASTRUCTURE.

The Avra Valley area is rural in nature with minimal urban infrastructure and services. The road, sewer, and other utility systems in the Avra Valley are often inadequate or currently unavailable (see the Infrastructure map, Figure 11). The north part of the study area near the Town of Marana is served by Interstate 10. Other major transportation corridors include Sandario Road, Ajo Way, Valencia Road, Avra Valley Road, Silverbell/Twin Peaks Road, and Picture Rocks Road. Many of the City parcels are accessed only by dirt roads.

There are over a dozen small water companies with small service areas in the Avra Valley. Tucson Water provides water service to two subdivisions in the northern part of the study area but not to the rest of Avra Valley. Tucson Water has 26 operational supply wells in the area with several storage tank facilities. The Avra Valley major transmission main runs from the southern part of Avra Valley (called the south wellfield) along Ajo Way and Valencia Road into the City.

EXISTING & POTENTIAL POLLUTION SOURCE MAP -FIGURE 10 LINK

INFRASTRUCTURE MAP - FIGURE 11 LINK

Most of the area's wastewater service is by septic tank; only a few miles of sewers are available within Avra Valley. It would be difficult to increase the residential density of the Avra Valley without major improvements to the sewer system. Currently, the County only allows installation of septic systems on parcels of an acre or more.

Major electric power lines and a natural gas pipeline are available but extensions or upgrades to these systems are necessary to support new development.

I. GENERAL VEGETATIVE CONDITION OF CITY OF TUCSON PROPERTY

In order to assess progress toward restoration of the City-owned Avra Valley parcels, staff examined aerial photographs and resource maps, visited parcels, and consulted with other City departments. Five "general vegetative condition" categories were determined based on various characteristics of the properties as described below.

- Class I and II Wildlife Habitat and Wildlife Movement Corridors - areas mapped on the Critical and Sensitive Wildlife Habitat Map by Dr. William Shaw and found to be in good/excellent condition. These are prime areas which support native vegetation and wildlife.
- Excellent Condition - areas which require little or no maintenance for weed control or were not disturbed by past uses.
- Good Condition - areas which may need minor maintenance or flood control improvements. Parcels in good condition typically have an adequate cover of native and/or non-native vegetation.
- Fair Condition - areas which need maintenance, revegetation, or flood control improvements. Parcels in fair condition typically have a consistent but sparse covering of native and/or non-native vegetation.
- Poor Condition - areas which need significant maintenance and revegetation. This condition is typically due to poor soils or erosion resulting from past flooding. The uneven terrain makes weed cutting with heavy equipment difficult and potentially dangerous.

The majority of City-owned property in the Avra Valley is at least in *good* condition, with minimal weeds and a consistent vegetative cover. However, some of the areas in good condition may need additional restoration to transition from non-native to native species to optimize enhancement for wildlife.

The general assessment estimates that 8% of the land (1,765 acres) is *Class I and II Wildlife Habitat*; 20% (4,642 acres) is in *excellent* condition; 57% (12,933 acres) is in *good* condition requiring little maintenance; 11% (2,541 acres) is in *fair* condition

requiring regular maintenance and revegetation; and 4% (987 acres) is in *poor* condition.

These categories were mapped to display the vegetative condition of the parcels (see the Condition of City of Tucson Property map, Figure 12).

IV. LAND USE ANALYSIS

The analysis identified the opportunities and constraints of specific sites to accommodate generalized land use groups: urban uses, such as residential, commercial, and industrial; governmental and institutional uses; grazing; wildlife habitat; and a wide variety of recreational activities.

For purposes of this study, farming as a potential use was eliminated because existing State water laws prohibit active irrigation (the use of pipes and pumps) with groundwater or water-harvested rainwater on farmlands retired for water rights. In addition, sand and gravel extraction and mining were eliminated as potential land uses due to their intense impacts upon the land, stringent regulatory procedures and difficulty in enforcing restoration upon completion of the activity. Leasing City property for grazing is generally not recommended and is covered in its own section beginning on page 48. Since, research on the impacts of grazing has shown that it can be a low, medium, or a high intensity use according to how grazing management is performed, specific sites with potential for grazing were not identified.

Site suitability for each land use group was based on the following considerations:

- Condition of the land (restoration status/vegetative cover).
- Infrastructure needs and availability.
- Impact from potential flooding.
- Proposed water-related projects.
- Potential impact on groundwater resources.

The analysis resulted in three maps showing potential locations for three intensities of land use activity (see the Opportunities and Constraints to Development maps, Figures 13 to 15). Should the Mayor and Council choose to consider future leases in the Avra Valley, the maps provide a general overview of locations which may be appropriate for the land use intensity groups. **These general locations are a starting point for more detailed site analysis to determine the appropriateness of the specific site for the proposed activity.**

CONDITION OF PROPERTIES MAP - FIGURE 12 LINK

LOW INTENSITY LAND USE MAP - FIGURE 13 LINK

MEDIUM INTENSITY LAND USE MAP - FIGURE 14 LINK

HIGH INTENSITY LAND USE MAP FIGURE 15 LINK

Land Use Intensities and Map Analysis

Characteristics of potential land uses were grouped into low, medium, and high intensity categories as described below.

- **Low intensity land uses** require no additional infrastructure such as improved roadway access, restroom facilities, or a water system due to a low volume of visitors and intermittent activity. In addition, low intensity uses are compatible with the floodplain because property improvements are minimal. Low intensity uses do not interfere with future Tucson Water projects and do not impact the restoration of the land to its natural condition. Examples of low intensity land uses include open space conservation and wildlife habitat; passive recreation such as picnicking, bird watching, and walking.

The physical condition of the parcel is the most important criterion for low intensity uses. Land in *poor* or *fair* condition is not currently suitable as open space for wildlife habitat, or passive recreation and was mapped as a constraint to use. These areas need rehabilitation. Land in *excellent* condition or identified as *wildlife habitat* is best suited to be part of an open space system. These lands could also provide passive recreation, possibly on a limited and controlled basis. Lands in *good* condition are also suitable for restoration for wildlife habitat and passive recreation.

Several locations for lower intensity land uses were identified. Opportunities for enhancement of open space conservation are promising due to the restored vegetative condition of the parcels and their location along major washes and between public preserves, offering proximity to large habitat areas and opportunity for wildlife corridors. See Figure 13 for the location of areas potentially suitable for low intensity land uses.

Open Space Conservation and Wildlife Habitat: While much of the critical and sensitive habitat in the Avra Valley was cleared for farming or destroyed due to overgrazing, wildlife resources remain. According to field and aerial photo inspection, the vegetative cover on over half of the City-owned lands has been restored. These lands are relatively weed-free, well-established with native and non-native species, and require minimal cutting and weed control.

Portions of the City-owned property have been classified as Critical and Sensitive Habitat for native wildlife. The Pima County Comprehensive Plan designates most of the City property as “Resource Conservation” in recognition of the 100-year floodplain boundary and the opportunity these lands present to extend an interconnected regional open space network. An open space system through Avra Valley could provide wildlife habitat along the Brawley Wash, and a migration route connecting the Tucson Mountains and Saguaro National Park on the east with the Roskrige Mountains on the west. Land between Saguaro National Park and City-owned properties is entirely in public ownership.

The Arizona Game and Fish Department has expressed an interest in assisting the City's efforts to enhance the City's property for wildlife habitat. Game and Fish staff suggest that the City apply for Heritage Funds and work with other interested parties to conduct experimental restoration projects. Grant requests to the Game and Fish Department for such a project are due November 30th of each year. The Sweetwater Wetlands project may serve as a model for this demonstration/education project. While benefits may not include monetary rewards, positive public relations for the City could result from establishing a wildlife preserve. Signage on fencing could go beyond the current property ownership statement and identify restored properties as a "City of Tucson Wildlife Preserve."

Preliminary analysis by Arizona Game and Fish identified the riparian areas and the parcels in the middle of the study area nearest Saguaro National Park and Tucson Mountain Park as the highest in wildlife value. These parcels are known as Simpson, Martin, Nichols, Bowden, Jarvis, Cactus, Trust No. 205, Edward Anway, Davidson, Wallis, 98 Farm Co., Growers Finance, Morse, Double Z, Buckelew, and Gin Farms.

Passive Recreation: Some portions of City-owned properties may be suitable for passive recreation uses such as hiking, picnicking, and wildlife viewing. Passive recreationists visit areas which have a diversity of vegetation, good views, respite from urban noise, and wildlife viewing possibilities. For this reason, the same areas which support wildlife are the most attractive to passive recreationists.

The City's Parks and Recreation Department has expressed willingness to participate (along with Tucson Water Department staff) in decisions regarding passive recreation in the Avra Valley by identifying user needs, reviewing project proposals, and coordinating with non-profit user groups. It may be inappropriate for the City to directly provide recreational uses (unless a fee is charged) which, given the distance from current boundaries, would not predominantly benefit City residents.

Any volume of human use would necessitate active management to assure that the needs of the land and the needs of the wildlife are not infringed upon. For example, if an area received a significant number of visitors, control of parking and designated hiking routes would be needed.

- **Medium intensity land uses** require minimal infrastructure, little or no water use, no permanent septic system waste disposal (but possible composting or portable chemical toilet), and limited improvements or development on the land. Medium intensity land uses may be compatible with flooding potential due to the low value of any site improvements, and are used intermittently by a low to moderate volume of visitors (no large events). Medium intensity uses may potentially interfere with future Tucson Water projects and prevent the

land from continuing to restore to a natural condition. Medium intensity land uses include active recreational pursuits, such as equestrian facilities, shooting ranges, and off-road trails for motorcycles and all-terrain vehicles.

Both the physical condition of the lands and existing infrastructure are important criteria for determining suitability for medium intensity land use activities. As shown on Figure 13 and Figure 14, lands in *excellent* condition or identified as *wildlife habitat* are the most sensitive and in limited supply. These areas were removed from consideration for medium intensity uses. The next criterion considered was a paved road within one-half mile of a site to accommodate anticipated access needs without negatively impacting air quality and neighboring properties. Properties lacking paved access within one-half mile were mapped as a constraint to medium intensity use.

The remaining sites emerge as areas of opportunity for medium intensity uses that require limited infrastructure and have minor impacts on the land. See Figure 14 for the location of these areas.

Active Recreation: Some City-owned properties may be suitable for active recreational uses such as equestrian activities, off-road trails for motorcycles and all-terrain vehicles, and shooting ranges. These uses are typically difficult to locate within City limits due to the generation of noise and/or dust, and the large land area required. Active recreational uses require a moderate level of facility development and management to assure that the needs of the users and the objectives of the City are met. Minimal facilities include a parking area, a developed activity area, and a non-permanent restroom facility. Facilities for these recreational uses are not typically provided by the City's Parks and Recreation Department. In the past, Parks has worked with private non-profit groups and private enterprise to assist in providing these facilities, and is willing to continue on this basis. As with passive recreation, a permit-only system could be required, and a permit fee charged to offset costs to the City.

- **High intensity land uses** require increased infrastructure for paved access and parking, and the use of water for septic systems, kitchens, and other facilities to respond to a large number of residents or visitors. In addition, high intensity land uses are not appropriately located in the floodplain due to the value of infrastructure and facility improvements. High intensity uses could seriously interfere with the ability of Tucson Water to implement future projects and conflict with the restoration of the land to its natural condition. High intensity land uses include urban uses (such as residential, commercial and industrial), governmental and institutional uses (such as training facilities and hospitals), and intense recreational uses including amusement parks, auto and motorcycle racing, and outdoor performance facilities.

Factors that were considered in determining potential locations for high intensity activities included the proximity to urban infrastructure, such as paved access roads and water service, as well as the location of the 100-year floodplain. All areas located over one-half mile from a paved access road, not in close proximity to a water company, or within the 100-year floodplain were mapped as constraints to high intensity land uses. Only three small areas emerge as potentials for high intensity uses. See Figure 15 for these locations.

Urban Development: Existing conditions present major constraints to urban development on City-owned Avra Valley land. Urban infrastructure, including roads, sewer, and other utility systems, is insufficient or non-existent. Groundwater pumping is extremely limited on agricultural land retired to secure water rights, and water providers in close proximity to City properties are limited. Two-thirds of the property is in the floodplain.

A major commitment of funds would be required to upgrade City land for urban development, along with agreements with outside agencies to provide police and fire protection. Current Pima County zoning and the Pima County Comprehensive Plan advocate very low density development. The higher residential densities, commercial, and industrial uses necessary to recoup infrastructure expenditures could have negative impacts on the land and groundwater, and would severely limit Tucson Water's ability to restore and/or use the land for water-related projects. Alternatively, encouraging development of vacant land and attending to infrastructure needs within current City boundaries would encourage a more compact urban form, decrease transportation needs, and improve air quality.

Governmental and Institutional Uses: Governmental and institutional uses include those such as police or fire training facilities, and may be suitable in the Avra Valley in limited locations. These uses require significant capital investment for infrastructure which, for City of Tucson facilities, could outweigh any financial advantages from building on land already owned by the City. Any development of this nature should comply with Pima County plans and code requirements, and be carefully located to avoid any contamination of the aquifer.

One use which may merit investigation is the possibility of leasing City property for pole-mounted photovoltaic solar panels. Collection of solar energy for commercial utility purposes requires a large land area. Again, a site-specific analysis would be needed for consideration of such a project, including mitigation of visual impacts from public preserves. In the past, Tucson Electric Power has expressed interest in expansion into alternative energy generation.

High-Intensity Recreational Uses: City-owned property in the Avra Valley is not suitable for high intensity recreational uses, such as amusement parks, auto or motorcycle race tracks, or concert stadiums. The area lacks the infrastructure to support the large number of participants and visitors who generally arrive and leave

at the same time. Sewer systems or septic system waste disposal and other urban facilities are required, including utilities and a water supply. High intensity recreational uses are typically land intensive, requiring large areas for facilities and parking, and thereby removing established vegetation. Nearby property owners and the groundwater resource could be negatively impacted by these uses, and tourist attractions such as Saguaro National Park and the Arizona-Sonora Desert Museum could be severely affected. Monitoring and enforcing leases for these uses would require a major commitment of City resources.

- **Grazing:** City staff consulted with a variety of resource people regarding the potential impacts from grazing on Avra Valley lands. The consensus was that typical grazing practices in the Southwest can be detrimental to the goal of land restoration but that under certain conditions, including careful management and monitoring, some City-owned property may be suitable for grazing with little or no adverse affect. Grazing leases would bring a small financial return to the City, but additional benefits could accrue by requiring the lessees to build and maintain fences, and to manage the land.

If grazing is not carefully monitored and managed, land can be overgrazed resulting in erosion, land surface compaction, and diminished vegetative cover, necessitating the restoration of the properties all over again. Stocking levels of cattle and their distribution across the range can also affect surface and groundwater quality. Watering places generally receive the highest impact from cattle. Erosion of the Brawley Wash and down-cutting of the channel has been partially attributed to turn-of-the-century overgrazing.

Providing water for the cattle is a significant problem, since only a small quantity of the water beneath the City's land can be pumped without being counted against the City's total right to pump. Leasing to owners or lessees of property adjacent to City land would enable stock to be "watered" on the adjacent land and allow stock to be moved off of City-owned properties during land rest seasons. It is also likely that an adjacent land owner/lessee would monitor the property on a more regular basis.

Modern rangeland management techniques can mitigate overgrazing and erosion problems caused by grazing. Prior to the establishment of grazing districts under the Taylor Grazing Act of 1934, public domain lands were subject to unregulated grazing. The United States Soil Conservation Service (SCS), now known as the Natural Resources Conservation Service (NRCS), was created in 1935 and charged with erosion control on a watershed basis. The NRCS develops voluntary farm or ranch conservation plans and recommends management techniques to reduce erosion due to grazing. Modern management techniques include:

- Cattle stocking based on the amount and type of forage.

- Correct seasonal use and rotation to minimize damage to seeding and immature perennial grasses.
- Control of livestock distribution through strategically placed fences, water holes, and salt licks to minimize negative impacts and optimize range resources.

Input from the local NRCS office indicates that this agency would be willing to work with the City of Tucson to develop management plans for grazing City-owned parcels, but only if City lands are leased to Avra Valley ranchers holding existing conservation plans with the NRCS. In addition, the NRCS provides only minimal monitoring (once a year) of the management plan and has no mechanism for enforcement of the plan.

The City is required by State law to use a bidding process to obtain the highest and best lease price and allow interested applicants an equal opportunity to lease City land. In the case of grazing, the highest bid may not necessarily be the best bid. A best bid process can be created for grazing which requires applicants to meet certain conditions as part of the bid submittal. In addition, a committee of rangeland managers, educators, and local ranchers could be created to assist City staff in the bid review process by providing professional expertise and local involvement.

V. FINDINGS AND RECOMMENDATIONS

This section of the report includes two sets of recommendations. The first section provides policy makers with recommendations to respond to requests for the use of Avra Valley parcels for various *Land Use* activities. The second section includes recommendations for the *Management and Restoration* of the properties.

A. LAND USE

Over the past several years, various activities have been proposed for the City's Avra Valley land, ranging from grazing to drag-strip racing. This study does not assume that any supplementary use of the City's Avra Valley land is necessarily appropriate. The land was purchased for water rights in order to assure a long-term future water supply for the City of Tucson. Leasing the land for additional uses could present a host of potential problems, as discussed in this report. The most significant impact would be damage to the quality or quantity of the water resource. The City has experienced difficulties in managing and enforcing land leases, and lease violations can lead to increased City maintenance costs for repair or clean-up of the violation.

The goals of this study are to: (1) encourage appropriate land uses which preserve water quality, water quantity, and water rights; (2) encourage cost-effective land uses beneficial to Tucson Water Department customers; and (3) assure the compatibility of land uses on City-owned property with other Avra Valley properties. These goals and the land use analysis support low intensity land uses for the City-owned property in the Avra Valley.

However, should the Mayor and Council wish to consider specific land use proposals, the following recommendations will assist in the evaluation of requests. Recommendations 1. through 7. address specific land uses that may be appropriate based on the inventory maps, the land use analysis, and issues discussed in this report. The recommendations are listed in order of land use intensity from the least intensive to the most intensive.

1. Open Space Conservation and Wildlife Habitat

Finding: Portions of City-owned Avra Valley land have been identified as critical wildlife habitat. Other areas could be restored to provide habitat, migration corridors, and an open space network. The Arizona Game and Fish Department has encouraged and will assist the City to create a restoration demonstration project. By excluding these critical properties from leasing consideration and enhancing their vegetative cover, the City can preserve water quality and capture an opportunity to demonstrate environmental leadership.

Recommendation: Preserve and enhance areas for wildlife habitat on City-owned Avra Valley land and promote a regional open space system.

- a. Preserve all Class I and Class II habitat for wildlife use.
- b. Discourage leases on restored land which would damage the established vegetative cover.
- c. Use fencing which is friendly to wildlife (see Recommendation 17).
- d. Develop permanent watering sites for wildlife on appropriate parcels.
- e. Work with the Arizona State Game and Fish Department to prepare and implement a wildlife habitat restoration program for targeted parcels in the Avra Valley through the following actions:
 - 1) Submit a request for a Heritage Fund grant to identify areas most appropriate to restore by conducting an on-site evaluation of habitat conditions.
 - 2) Request Heritage funds to develop restoration guidelines and implement a demonstration project. The restoration program should include enhancement of riparian areas and conversion of upland vegetation to native vegetation as is possible; in particular, replace non-native grasses such as Buffelgrass and Lehmann's Lovegrass with native species.
- f. Contact the University of Arizona Arid Lands (or other appropriate departments) and the Arizona-Sonora Desert Museum to develop other restoration and enhancement projects.
- g. Investigate the use of conservation easements on selected parcels to assure long-term conservation for wildlife purposes.

2. Passive Recreation

Finding: Some City-owned properties may be suitable for passive recreational uses such as hiking, picnicking, and wildlife viewing. These uses create no adverse impact on the groundwater resource and require little infrastructure or investment.

Recommendation: Identify passive recreational uses that could be appropriately located on City-owned Avra Valley land.

- a. Conduct a needs assessment, identify locations for passive recreation using the Opportunities and Constraints to Development of Low Intensity Uses Map as a general guide, and develop a management plan for passive recreation in the Avra Valley.
- b. Consider allowing recreational use by permit only. Fees could be assessed for the permit to offset management costs.

3. Active Recreational Uses

Finding: Active recreation, including equestrian uses, model airplanes, off-road trails, and shooting ranges may be appropriate on selected City-owned properties. These uses are difficult to locate within City boundaries where noise and dust may create problems.

Minimum facilities are needed and can be developed without threatening the groundwater resource.

Recommendation: Consider leases for selected active recreation on City property in the Avra Valley. The Parks and Recreation Department should assist Tucson Water in evaluating lease requests from private and non-profit recreational groups and participate in the review of development plans.

4. Urban Development (Residential, Commercial, and Industrial)

Finding: Urban development, including residential, commercial and industrial uses, have significant and expensive infrastructure requirements which cannot be met on City-owned Avra Valley land. These intense land uses can threaten the groundwater resource, limit the potential for water-related projects, and are not appropriate within the floodplain. Urban development in the Avra Valley detracts from inner City infill, increases transportation needs and costs, and negatively impacts air quality.

Recommendation: Urban development is not recommended for City-owned property in the Avra Valley.

5. Governmental and Institutional Uses

Finding: Water-related projects by Tucson Water are appropriate on City property in the Avra Valley. Under certain conditions, some other governmental and institutional uses may be appropriate. These uses (such as police and fire training facilities, utilities, and hospitals) require significant capital for infrastructure and may pose a threat to groundwater. Careful siting and monitoring of development and use would be necessary. The collection of solar energy is one institutional use which merits further investigation.

Recommendation: Consider requests for government and institutional uses, and explore the potential for locating experimental energy alternatives.

6. High Intensity Recreation

Finding: Recreational uses with high numbers of visitors or participants, significant infrastructure needs, and a need for large land areas to accommodate facilities and parking are not suitable on City property in the Avra Valley. These uses can pose a severe threat to the groundwater, create noise and dust that disturbs neighbors and impose on prime tourist attractions such as the Arizona-Sonora Desert Museum and Saguaro National Park, and are incompatible with restoration of the land and potential water-related projects.

Recommendation: High intensity recreational uses in the Avra Valley are not recommended.

7. Managed Grazing

Finding: Grazing is generally not recommended on City-owned parcels in the Avra Valley due to the potential negative impacts to the land and lack of City ability to manage, monitor, and enforce grazing activity. However, should the Mayor and Council choose to consider grazing leases, several conditions are recommended to limit potential negative impacts. The Natural Resources Conservation Service (NRCS) has offered to assist the City in developing grazing management plans with certain prerequisites. Careful monitoring will be necessary to assure that lands are not degraded during grazing.

Recommendation: While grazing is not a generally recommended land use, grazing leases should only be considered when the following procedures are followed:

- a. Create a “best” bid process with the following conditions to be met prior to accepting bids.
 - 1) Require that all applicants have an existing management plan with the NRCS before submitting bids to lease City lands for grazing.
 - 2) Limit consideration of grazing leases to applicants who either own or lease properties adjacent to the City-owned lands they wish to lease.
- b. Create a bid review committee with local and professional representation.
- c. Prohibit the “watering” of stock on City-owned property as part of any grazing lease.
- d. Allow grazing only on a prescribed seasonal basis as recommended by the NRCS.
- e. Require that the lessee be responsible for the installation and maintenance of wildlife-friendly fencing of the City’s land.
- f. Develop procedures and resources to monitor and enforce all grazing leases.

B. PROPERTY MANAGEMENT AND RESTORATION

There are many issues involved in managing and maintaining 36 square miles of land in 32 separate parcels scattered over 400 square miles and 25 miles away from the City center. In addition to the Land Use Recommendations above, the following will improve the management and restoration of the land. Recommendations 8. through 12. are pertinent when any lease is considered or negotiated, and Recommendations 13. through 17. will assist in the clarification of management and restoration procedures.

8. Water Resource Considerations

Finding: The City purchased land in the Avra Valley to secure water rights for future needs. The preservation and protection of the Avra Valley aquifer is of utmost importance to the future of the City. In addition to securing the water resource, City ownership of large tracts of vacant lands in the Avra Valley provides Tucson Water with opportunities for future recharge and other water-related projects.

Recommendation: Protect the quality and quantity of Avra Valley water resources, and provide options for water-related projects through the following actions:

- a. Evaluate proposed land uses for their potential to pollute the aquifer. This evaluation should include materials that will be stored or used on site.
- b. Only allow land uses with low pollution potential, i.e., those which require minimal storage and handling of potential pollutants.
- c. Improve the management and enforcement of waste disposal practices.
- d. Require that lessees provide their own water service from adjacent water sources and not be allowed to pump groundwater on City-owned land.
- e. Identify parcels with potential for water-related projects that should not be leased.
- f. Use short-term leases (five years or less).

9. Cost-Benefit Analysis

Finding: The current cost to the City to maintain the lands in Avra Valley is \$4.60 and acre - or \$105,000 a year. This figure is a relatively minor cost compared to the asset value of the property at \$25,000,000, as well as the value of the water resource. Increased leasing of City-owned land will require additional monitoring by City staff to assure compliance with conditions of the lease and maintenance of the land, adding expense and offsetting some of the potential income to the City.

Recommendation: Identify costs and benefits to the City before leasing City-owned land, recognizing that some benefits may not be measurable in monetary units. Assure that lease applicants have adequate resources to manage and maintain the property.

10. Leasing Procedures

Finding: There are no institutionalized procedures for accepting requests for use of City-owned land in the Avra Valley. Currently, a proposal for lease of City land may be made by telephone, in writing, or in person. The lease applicant may or may not provide appropriate information to evaluate the request. In addition, the City has no formalized criteria to judge the benefits or disadvantages of a request for use. Currently, requests to lease City-owned property are evaluated informally by pertinent departments.

Recommendation: Establish written procedures for land lease applications, evaluation procedures and criteria, and lease conditions. Land lease applications should include:

- a. Specific information about the proposed land use.
- b. Site criteria such as size, location, and infrastructure needs.
- c. Applicable Pima County codes and regulations and ability to conform.
- d. Requested length of lease.
- e. Requested lease payment.
- f. Operating procedures including the use or storage of potentially hazardous materials.
- g. Water needs and resources.
- h. Insurance provisions.
- i. Maintenance and management responsibilities the applicant is prepared to assume.

The land lease procedures should include:

- j. Contingency plans for clean-up when tenants engage in improper hazardous material storage.
- k. Condition the property is expected to be in upon termination of the lease.
- l. Consequences of not abiding by the lease.

11. Floodplain Considerations

Over 66 percent of City-owned properties in the Avra Valley are located in the 100-year floodplain. Some land uses, particularly those which require a large investment for infrastructure, could be severely damaged if flooding occurred.

Recommendation: Inform applicants for lease of City-owned land of any potential for flooding and advise that all improvements must be designed in accordance with Pima County floodplain regulations. Infrastructure improvements within the floodplain should be minimized.

12. Tourism

Finding: The Arizona-Sonora Desert Museum, Saguaro National Park, and Tucson Mountain Park draw thousands of visitors to the Tucson region. These visitors contribute to the strong local tourism economy. An important part of the experience of visiting these areas is the dramatic views of the Avra Valley from their various viewpoints. In addition, excessive noise, traffic, and night lighting from intensive activities in the valley could impact the operation of these facilities.

Recommendation: Permit only low intensity land uses within the viewsheds of the Arizona-Sonora Desert Museum, Tucson Mountain Park, and the Saguaro National Park viewpoints. Mitigation techniques to naturalize the view should be required for any development that impacts views from these areas.

13. Management of the Properties

Finding: The City has managed and maintained the Avra Valley properties well given existing resources, the large number of acres, and the non-contiguous nature of the parcels. Hiring or leasing to the private sector for management and maintenance of the properties could interfere with future desired City projects, and could be more expensive, difficult to monitor and enforce, and may not result in desirable land conditions.

Currently, Tucson Water manages and maintains the City-owned land in the Avra Valley while Real Estate manages the property in terms of potential property sales, purchase, and leases. Management could be improved with the clarification of departmental responsibilities. Offers from the private sector to manage the land would limit flexibility for land use and are not in the City's best interest.

Recommendation: Continue the restoration and management of City-owned properties in the Avra Valley by Tucson Water staff.

- a. Implement Land Use and Management Recommendations.
- b. Identify responsibilities of other City Departments regarding Avra Valley land and clarify procedures for managing and leasing properties.

14. Property Inventory

Finding: A complete inventory of the existing condition and maintenance needs for each parcel of City property does not exist. Tucson Water has maintained City property through an informal process which relies heavily on the knowledge of the resident caretaker, who has begun to develop an informal inventory of information about Avra Valley holdings. Allocation of additional resources would expedite the completion of this project.

Recommendation: Develop an inventory and data base of information about Avra Valley properties which can be accessed by pertinent City Departments. The data base should include:

- a. Legal description of each parcel.
- b. Condition of land.
- c. Location and condition of existing structures, wells, fences, and dikes.
- d. Sites requiring clean-up.

15. Land Restoration and Revegetation

Finding: The restoration of farmlands to a natural vegetative state is a difficult and lengthy process. Planning staff estimates that over half of the City-owned lands in the Avra Valley are at least in good condition with minimal weeds, erosion, or dust. The remaining 50 percent (approximately 10,000 acres) needs further revegetation and weed elimination. Some parcels require the cutting of weeds two or three times a year; other

parcels are not maintained due to eroded terrain and the inability to safely maneuver machinery in the area.

City-owned properties in Brawley Wash floodplain were developed for irrigation with the construction of dikes, floodways, ditches and roads. Revegetation and wildlife habitat could be improved with the reintroduction of flooding on certain parcels as long as there is no threat to homes, roadways, and active farms.

Restoration of City property could also be expedited by harvesting stormwater runoff to establish vegetation. The Arizona Department of Water Resources (ADWR) defines irrigation as the application of water to two or more acres of land to produce plants or plant parts for sale or use as feed. Water harvesting that does not involve the active application of water through the use of pumps or pipes would not be considered “irrigation.” Harvesting stormwater runoff is allowable so long as it is not diverting water from a wash or water channel.

Recommendation: Improve and expedite restoration of City-owned property through the following actions:

- a. Continue to cut and control weeds.
- b. Revegetate with native vegetation.
- c. Provide floodcontrol and/or grade property to safely maneuver maintenance machinery.
- d. Investigate removing flood control structures to improve vegetation and wildlife habitat as long as there is no increase of potential flooding or damage to any non-City owned property.
- e. Pursue the development of a demonstration waterharvesting project, in conformance with the requirements of ADWR, to revegetate a parcel in poor condition, including the use of swales and ditches to direct rainwater.

16. Property Clean-up

Finding: In 1976, the federal government passed the Resource Conservation and Recovery Act (RCRA) in order to provide a framework for the production, storage, transportation, and eventual disposal of wastes that pose a risk to health and the environment. The City of Tucson has recently formed a RCRA survey team to assure that the City conforms to requirements of the Act. This team is composed of representatives from the Fire Department, the Office of Environmental Management, and the Risk Management Division.

Given existing resources, the City has made strides in the cleanup of the old farm houses, outbuildings, nonoperational retired agricultural well sites, and wildcat dumps on the Avra Valley properties. However, more remains to be done to upgrade the properties. An assessment of potential soil contamination from previous agricultural uses is needed for the City-owned nonoperational well-sites. If contamination is present, mitigation is necessary

to conform with federal and local requirements. In addition, inactive wells are the most susceptible to future contamination.

Recommendation: Continue to clean-up Avra Valley properties by funding and implementing the following activities:

- a. Include the City's RCRA Survey Team in the initial assessment of abandoned structures, wildcat dumps, and other clean-up sites to assure proper disposal.
- b. Implement a program to identify wells which are potential conduits of contamination to the aquifer and legally abandon those wells. Continue to research the mitigation of soils contaminated from previous agricultural uses with bioremediation technologies.
- c. Develop a program and provide resources to clean up trash, demolish structures (including an asbestos inspection and abatement program), and perform other needed maintenance on City-owned property.

17. Trespass Issues

Finding: Trespass issues include cattle grazing, recreational vehicles, storage of beehives, target practice, wildcat dumping, and access through City land to other properties. In many cases, City maintenance personnel are unable to address trespassing onto City lands because of uncertainty where property lines occur. The City's Avra Valley Property Holdings Map is not accurate .

Maintenance of Avra Valley properties includes continued fencing of properties and signage. Fencing is an ongoing need due to fence-cutting during trespass and the theft of fence materials. Procedures for installation of "wildlife fencing" would be beneficial for native animals. In addition to trespassing, fencing and posting of City lands is difficult due to unknown or imprecise boundaries. A legal survey of the properties is important for properties which may be leased and fenced, such as for grazing.

Recommendation: Resolve trespass issues through the following actions:

- a. Clarify the authority of City personnel to address trespassers.
- b. Initiate a program for a legal survey of all City-owned properties.
- c. Update the City's Avra Valley Property Holdings Map.
- d. Continue the program of fencing and posting of City lands, utilizing wildlife fencing with the following characteristics:
 - 1) Four strand fencing with smooth top wire and smooth bottom wire.
 - 2) Bottom wire a minimum of 18" from the ground.
 - 3) Top wire maximum height at 42" above ground.

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